

299-W22-22 (A4967) Log Data Report

Borehole Information:

Borehole: 299-W22-22 (A4967)		Site: 216-U-12 Crib			
Coordinates (WA St Plane)		GWL¹ (ft): 250.0	GWL Date: 06/27/03		
North	East	Drill Date	TOC² Elevation (ft)	Total Depth (ft)	Type
134464.315 m	567617.274 m	07/60	693.66	301	Cable

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded steel	1.65	8 5/8	8 1/8	0.25	+1.65	301

Borehole Notes:

The logging engineer measured the casing stickup using a steel tape. A caliper was used to measure the outside casing diameter. The caliper and inside casing diameter were measured using a steel tape, rounded to the nearest 1/16 in.; casing thickness was calculated. Total depth (301 ft) is derived from Ledgerwood (1993). However, total logging depth was 249 ft, 1.0 ft above groundwater. Because of waste management issues, Stoller was not permitted to log below the water table. Ledgerwood (1993) reported the casing was perforated from 225 to 300 ft. The logging engineer measured the depth to water. Coordinates and top of casing (TOC) elevation are derived from HWIS³. Logging data acquisition is referenced to the TOC.

Logging Equipment Information:

Logging System: Gamma 2E	Type: SGLS (70%) SN: 34TP40587A
Calibration Date: 03/03	Calibration Reference: GJO-2003-430-TAC
Logging Procedure: MAC-HGLP 1.6.5, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3 Repeat		
Date	06/27/03	06/30/03	06/30/03		
Logging Engineer	Spatz	Spatz	Spatz		
Start Depth (ft)	249.0	101.0	30.0		
Finish Depth (ft)	100.0	2.0	5.0		
Count Time (sec)	100	100	100		
Live/Real	R	R	R		
Shield (Y/N)	N	N	N		
MSA Interval (ft)	1.0	1.0	1.0		
ft/min	N/A ⁴	N/A	N/A		
Pre-Verification	BE050CAB	BE051CAB	BE051CAB		
Start File	BE050000	BE051000	BE051100		
Finish File	BE050149	BE051099	BE051125		

Log Run	1	2	3 Repeat		
Post-Verification	BE050CAA	BE052CAA	BE052CAA		
Depth Return Error (in.)	0	0	0		
Comments	Fine-gain adjustment made after file BE50121.	No fine-gain adjustment.			

Logging Operation Notes:

Spectral gamma logging was performed in this borehole on June 27 and June 30, 2003. Logging was conducted with a centralizer on the sonde and measurements are referenced to TOC. A repeat section was collected in this borehole to evaluate system performance.

Analysis Notes:

Analyst:	Henwood	Date:	07/16/03	Reference:	GJO-HGLP 1.6.3, Rev. 0
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Pre-run and post-run verifications for the logging system were performed before and after each day's data acquisition. The acceptance criteria were met.

A casing correction for 0.25-in.-thick casing was applied throughout the borehole.

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated with an EXCEL worksheet template identified as G2EMar03.xls using an efficiency function determined from annual calibrations. Dead time and water corrections were not necessary.

Log Plot Notes:

Separate log plots are provided for the man-made radionuclides (^{137}Cs and ^{60}Co) detected in the borehole, naturally occurring radionuclides (^{40}K , ^{238}U , ^{232}Th [KUT]), a combination of man-made, KUT, and dead time, and total gamma plotted with dead time. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, casing corrections, or water corrections. A repeat log section is also included.

Results and Interpretations:

^{137}Cs and ^{60}Co were the man-made radionuclides detected in this borehole. ^{137}Cs was detected at a few sporadic locations in the borehole near its MDL of approximately 0.2 pCi/g. ^{60}Co was detected between 242 and 248 ft near its MDL of 0.05 pCi/g. Historical gross gamma logs from Fecht et al. (1977) (attached) indicate an influx of gamma activity between 70 and 89 meters (230 to 80 ft) between 1965 and 1970 that had mostly decayed away by 1976. On the basis of the current SGSLs log, this activity can be attributed, at least in part, to ^{60}Co contamination.

Notable changes are observed in the KUT and total gamma logs. An interval between 188 and 208 ft indicates relatively low KUT concentrations. The driller's log suggests "caliche" in this interval. The early Palouse soil (161 to 189 ft) is identified by a 0.3-pCi/g increase in the ^{232}Th concentration and a 75-cps increase in total gamma count rate. The naturally occurring ^{238}U concentrations determined from log run 2

between 2 and 101 ft appear slightly elevated relative to the remainder of the borehole. It is likely enhanced radon existed in the borehole during this log run.

The repeat section indicated good agreement of the naturally occurring KUT.

References:

Fecht, K.R., G.V. Last, and K.R. Price, 1977. *Evaluation of Scintillation Probe Profiles from 200 Area Crib Monitoring Wells*, ARH-ST-156, Atlantic Richfield Hanford Company, Richland, Washington.

Ledgerwood, R.K., 1993. *Summaries of Well Construction Data and Field Observations for Existing 200-East Resource Protection Wells*, WHC-SD-ER-TI-007, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

¹ GWL – groundwater level

² TOC – top of casing

³ HWIS – Hanford Well Information System

⁴ N/A – not applicable

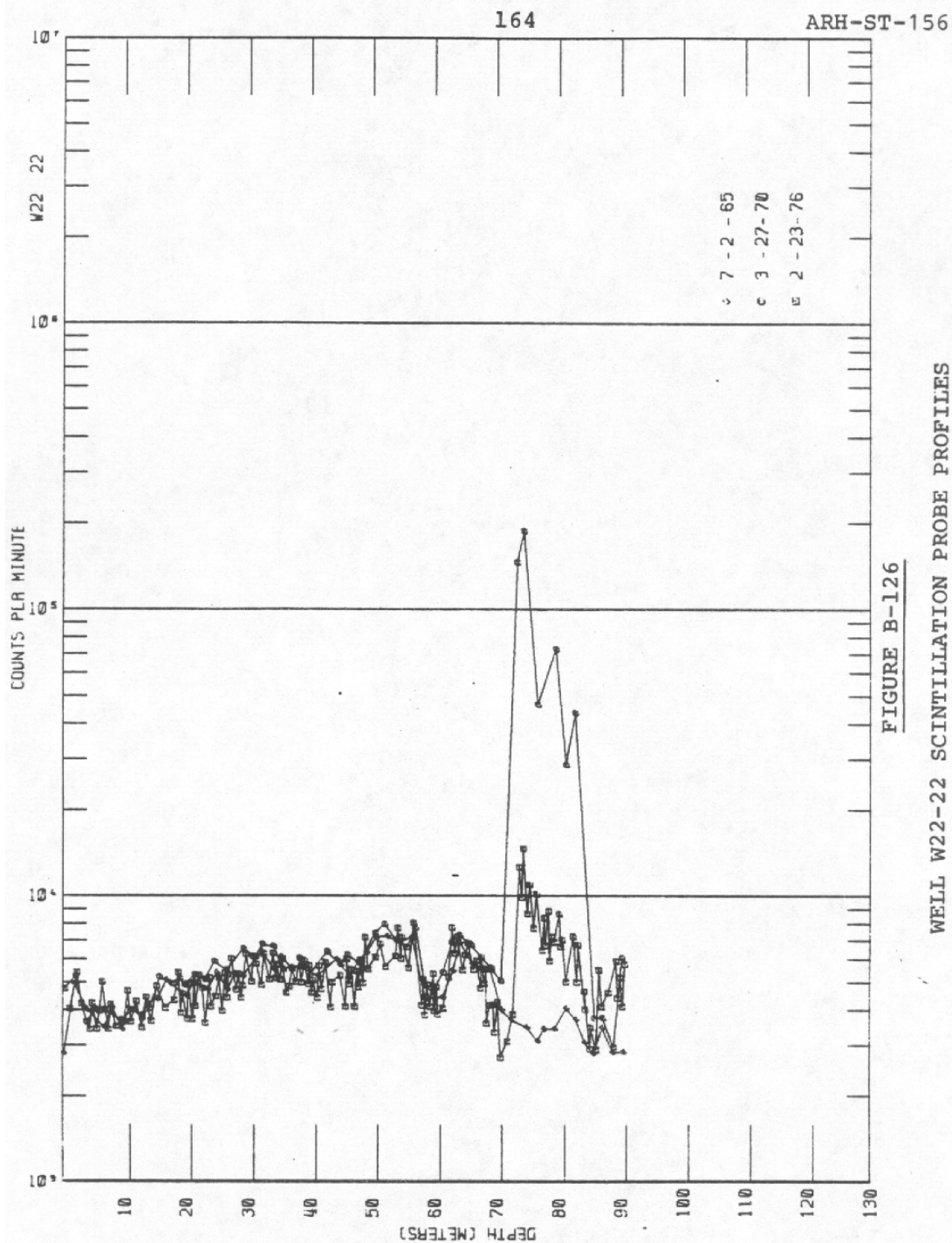


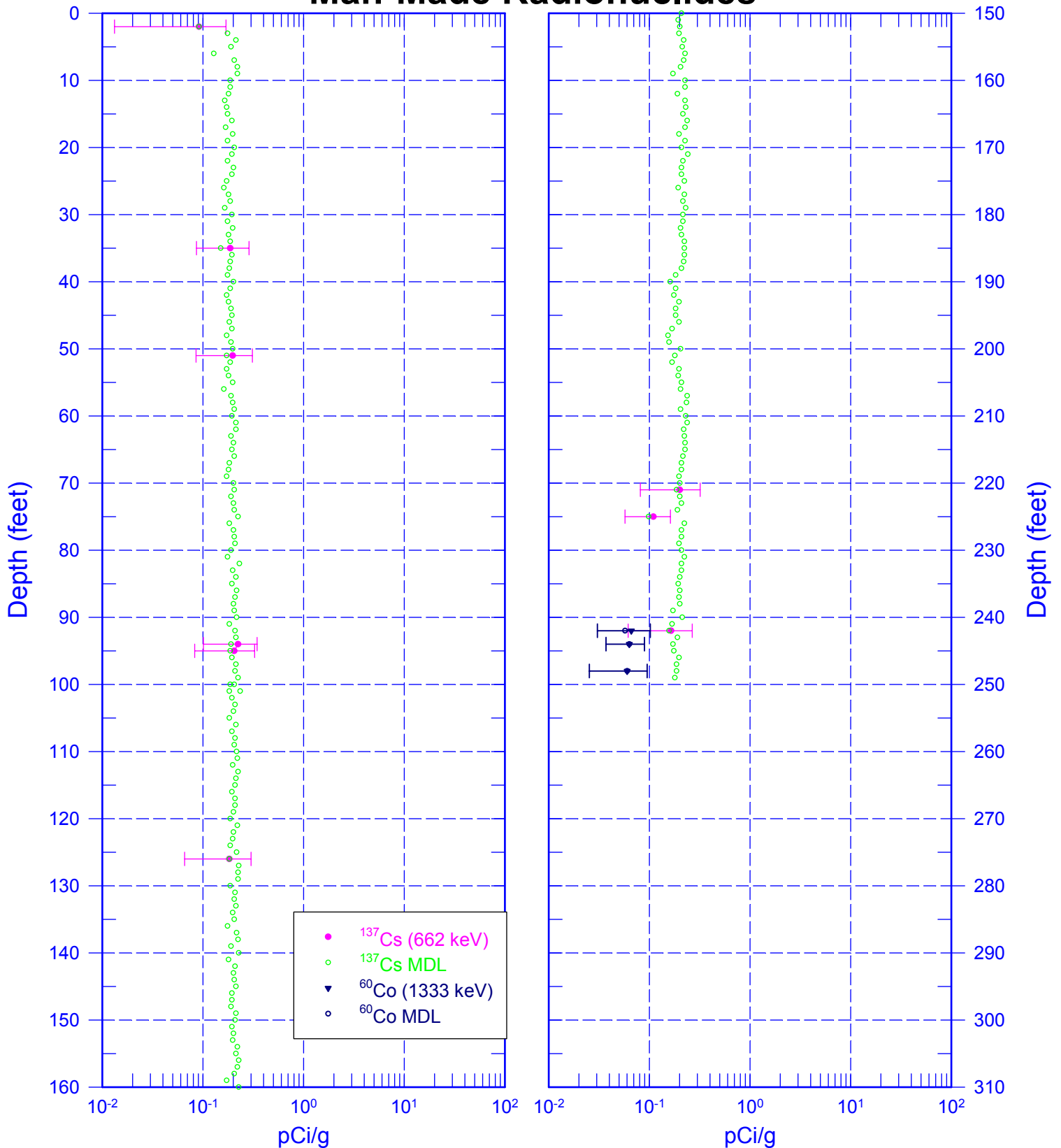
FIGURE B-126
WELL W22-22 SCINTILLATION PROBE PROFILES

from Fecht et al. (1977)

Scintillation Probe Profiles for Borehole 299-W22-22, Logged on 7/2/65, 3/27/70, and 2/23/76

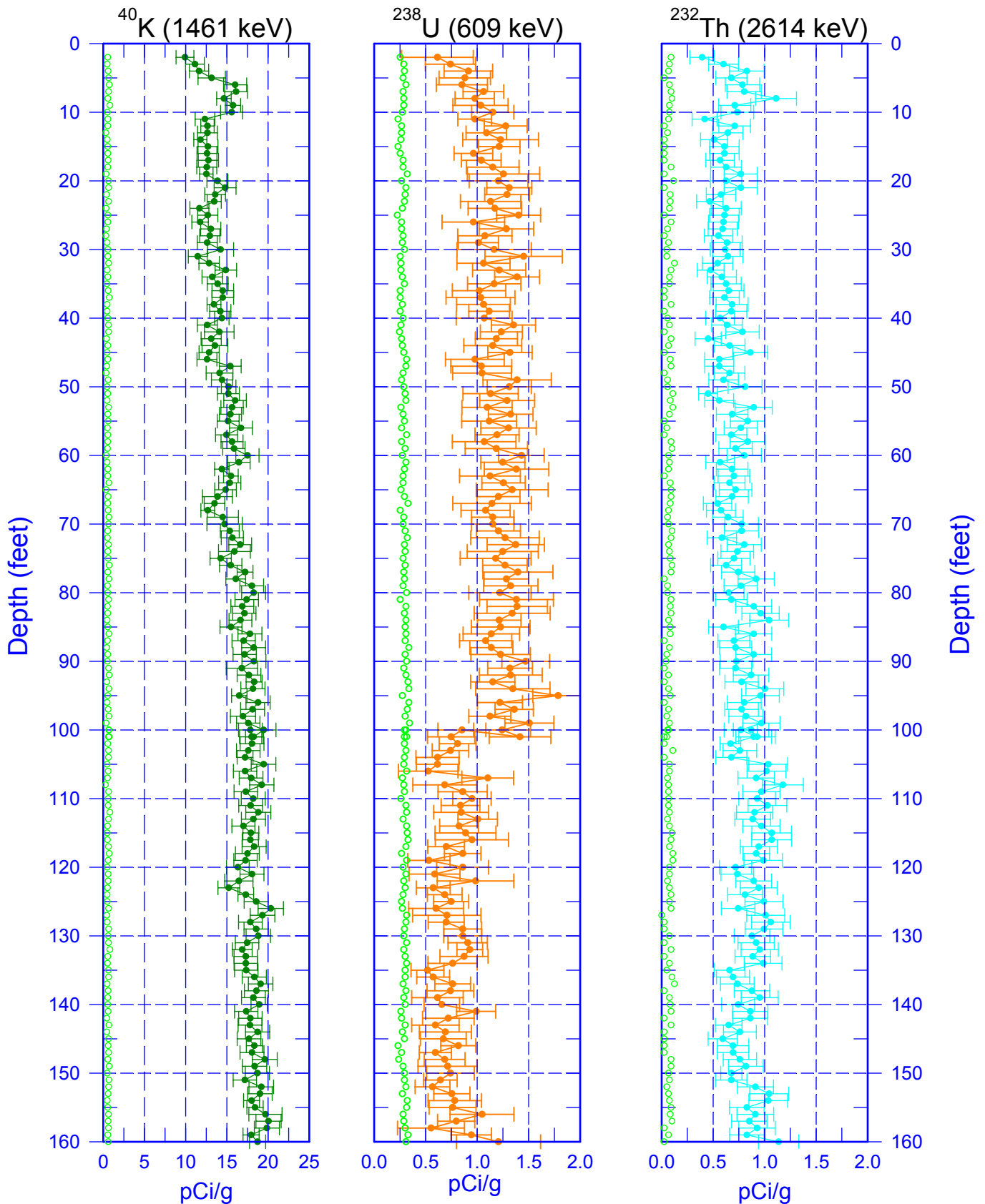
299-W22-22 (A4967)

Man-Made Radionuclides



299-W22-22 (A4967)

Natural Gamma Logs



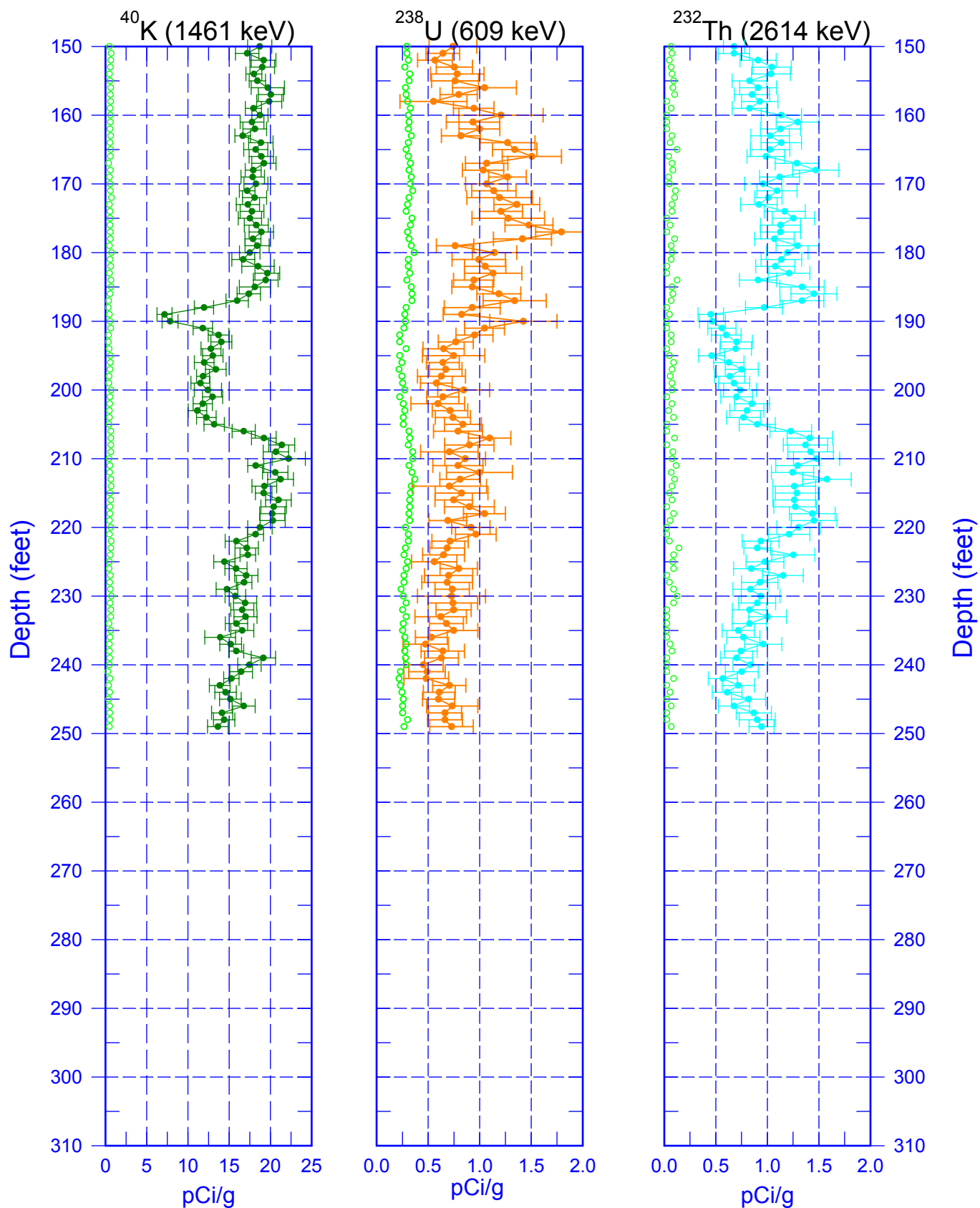
Zero Reference = Top of Casing

○ MDL

Last Log Date - 06/30/03

299-W22-22 (A4967)

Natural Gamma Logs

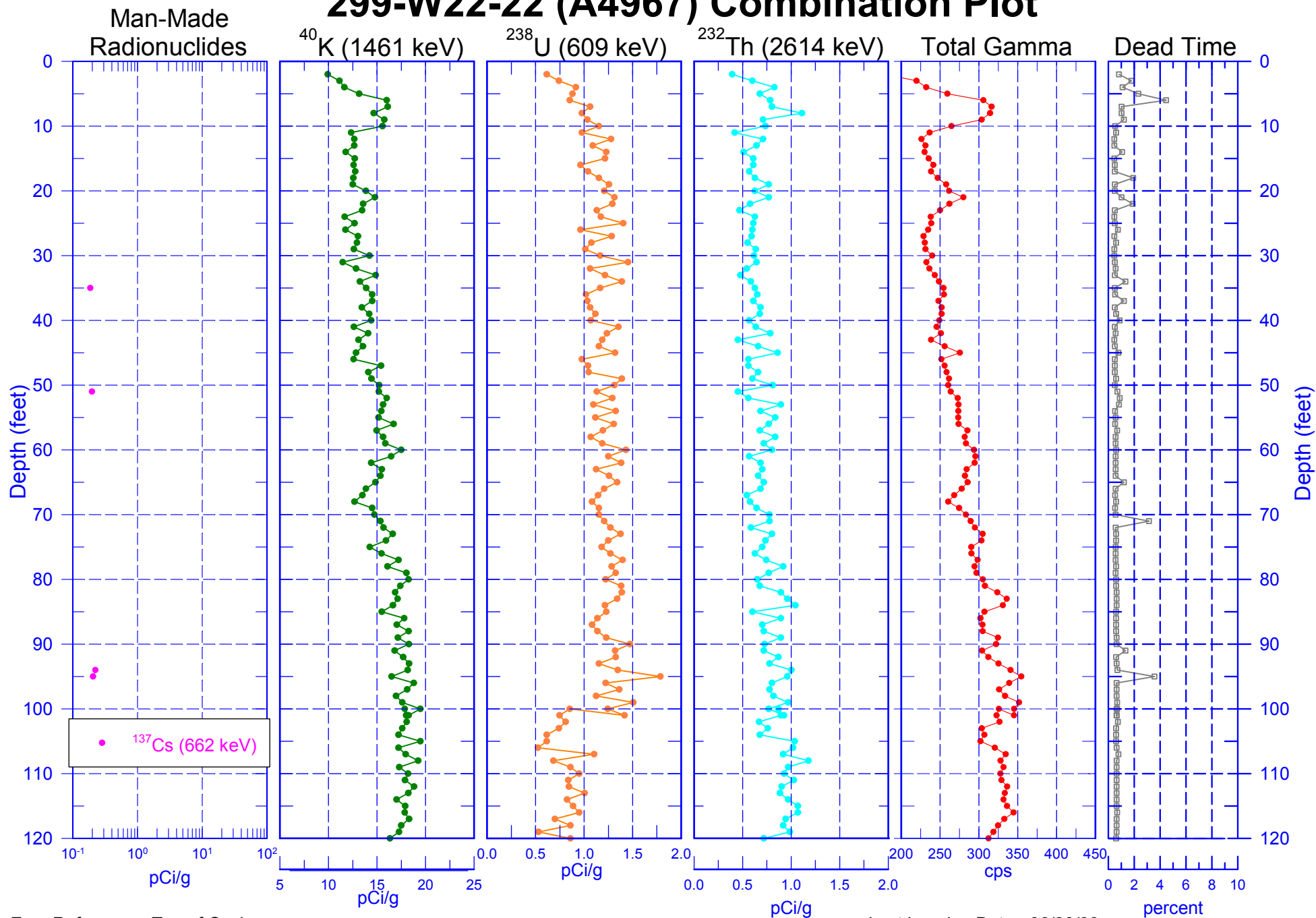


Zero Reference - Top of Casing

○ MDL

Last Log Date - 06/30/03

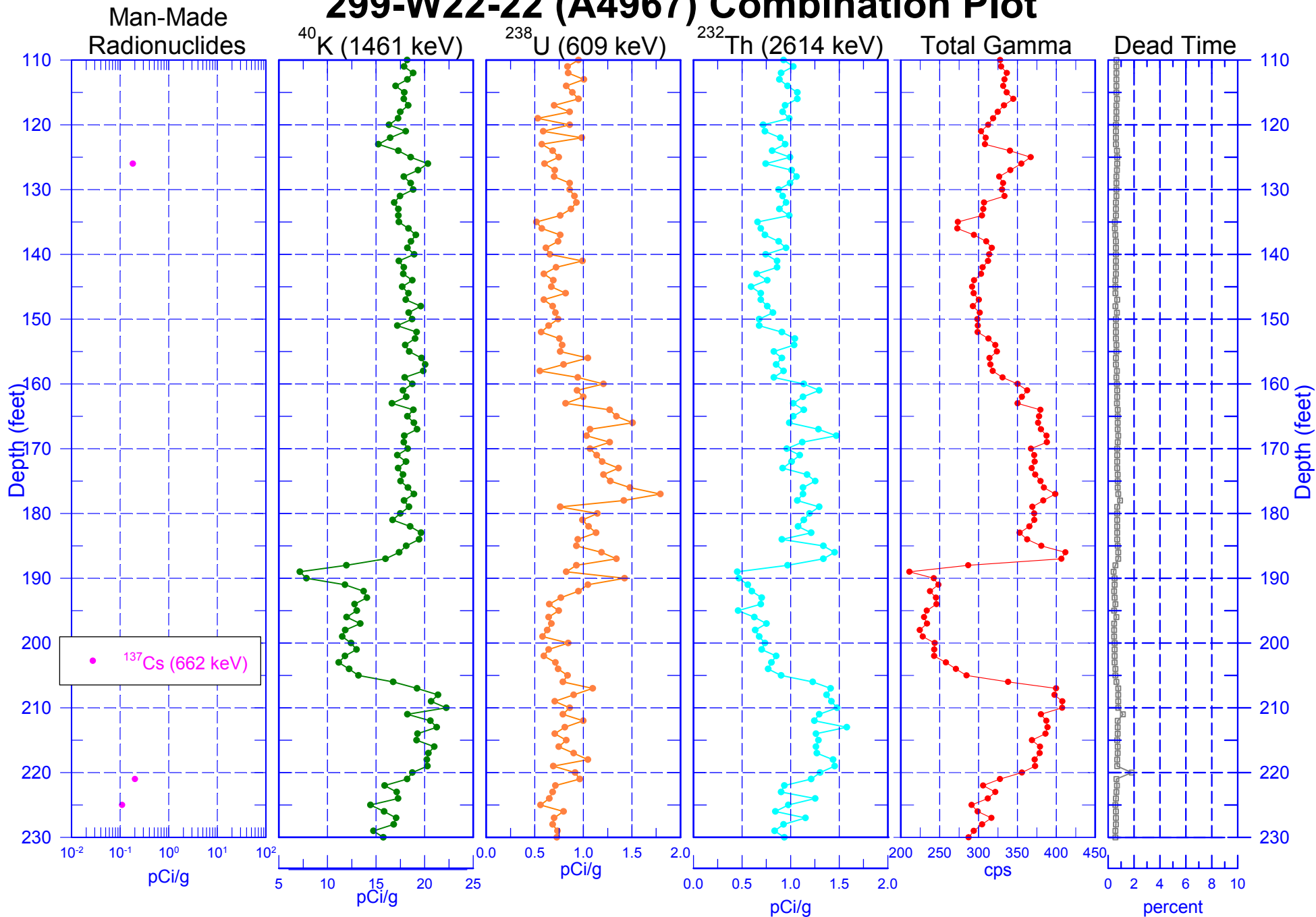
299-W22-22 (A4967) Combination Plot



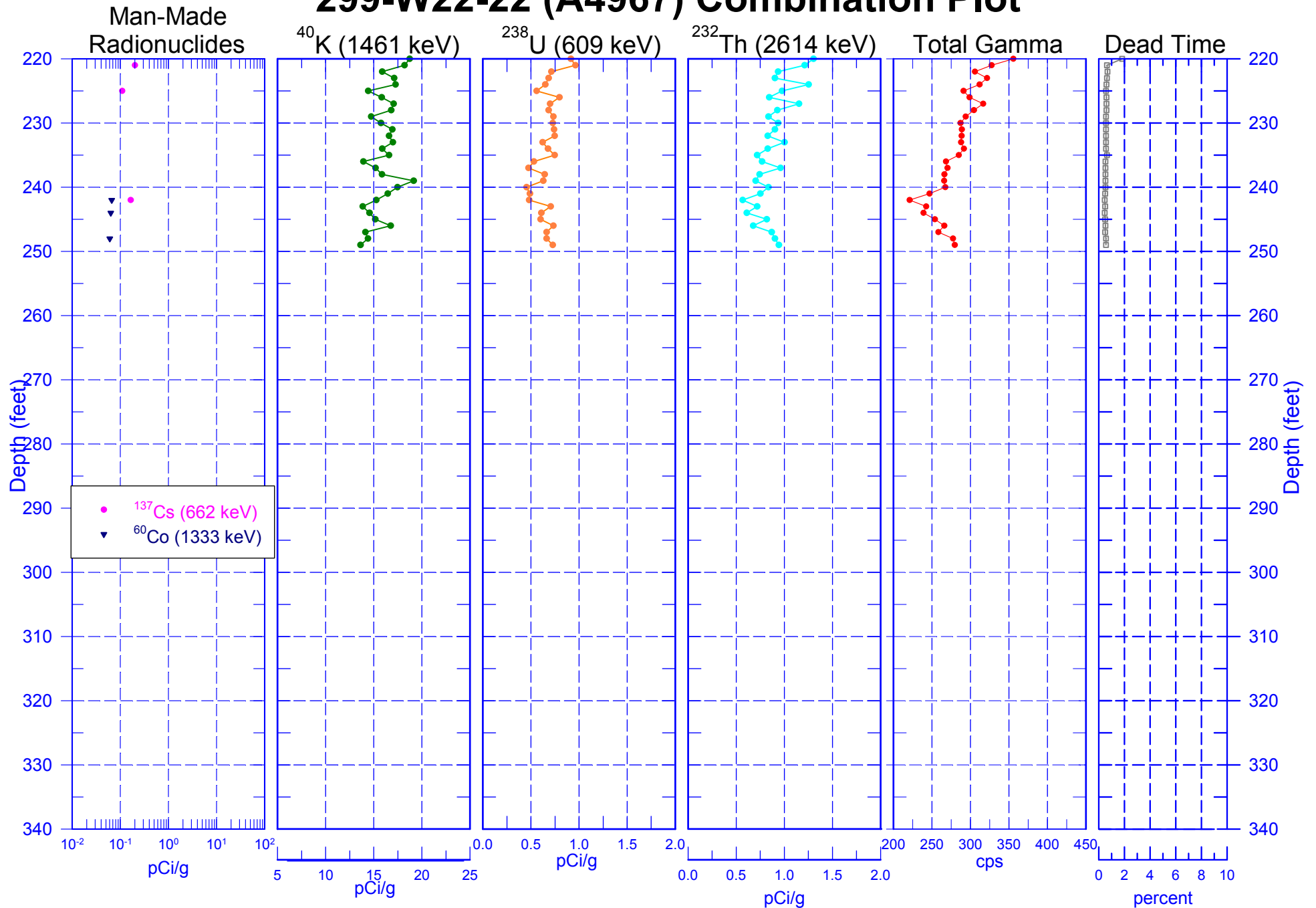
Zero Reference - Top of Casing

Last Logging Date - 06/30/03

299-W22-22 (A4967) Combination Plot



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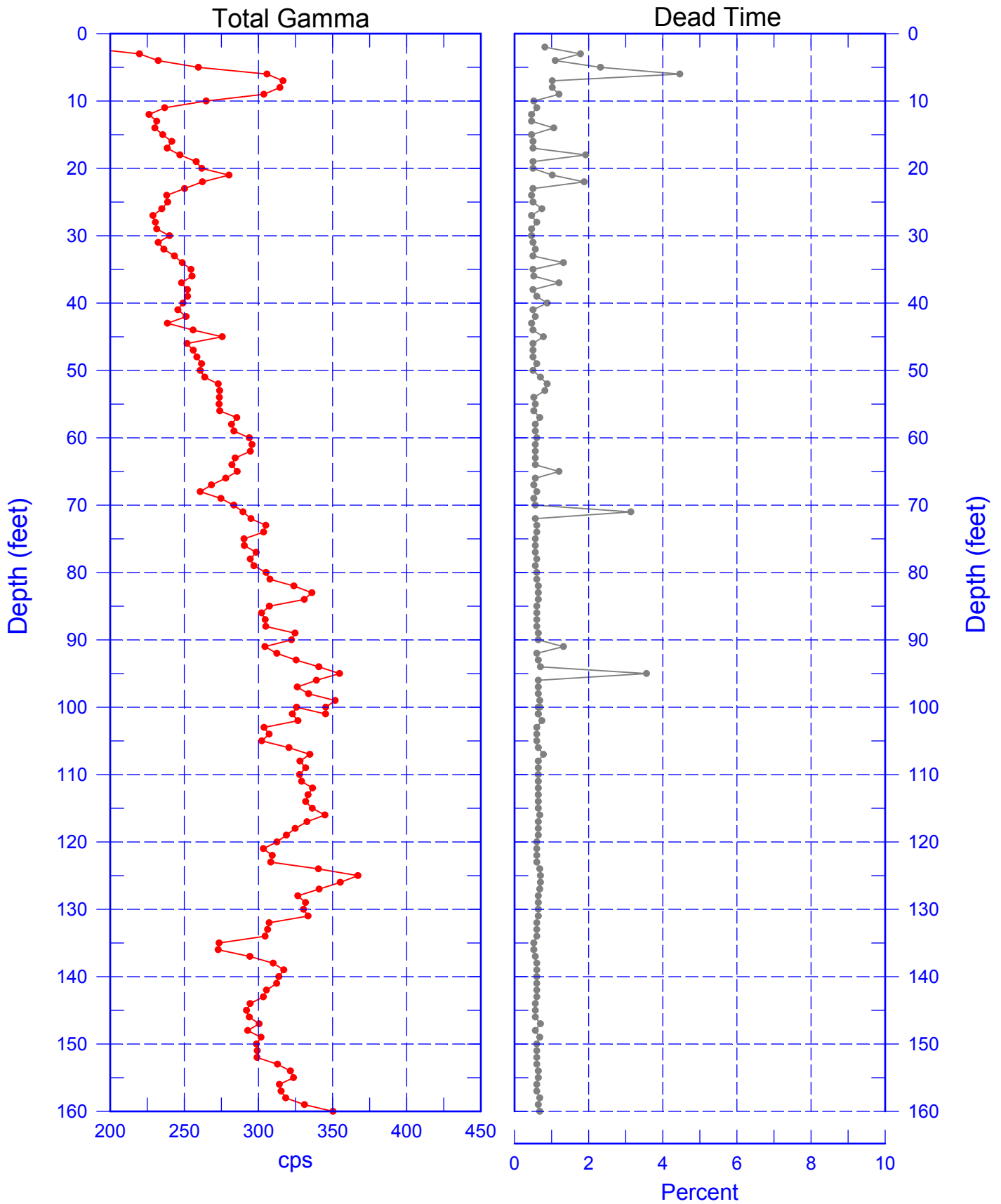


Zero Reference - Top of Casing

Last Logging Date - 06/30/03

299-W22-22 (A4967)

Total Gamma & Dead Time

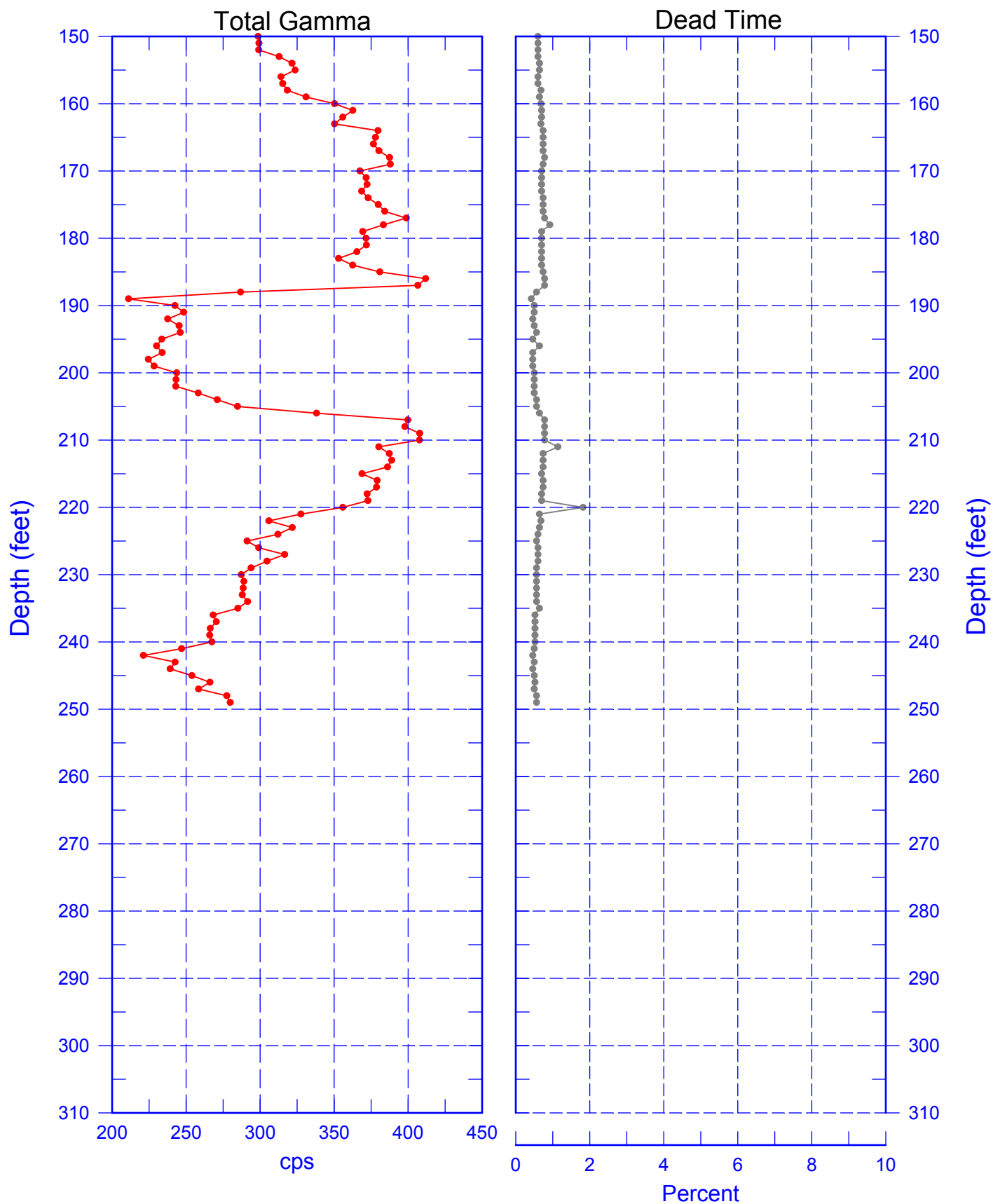


Reference - Top of Casing

Last Log Date - 06/30/03

299-W22-22 (A4967)

Total Gamma & Dead Time

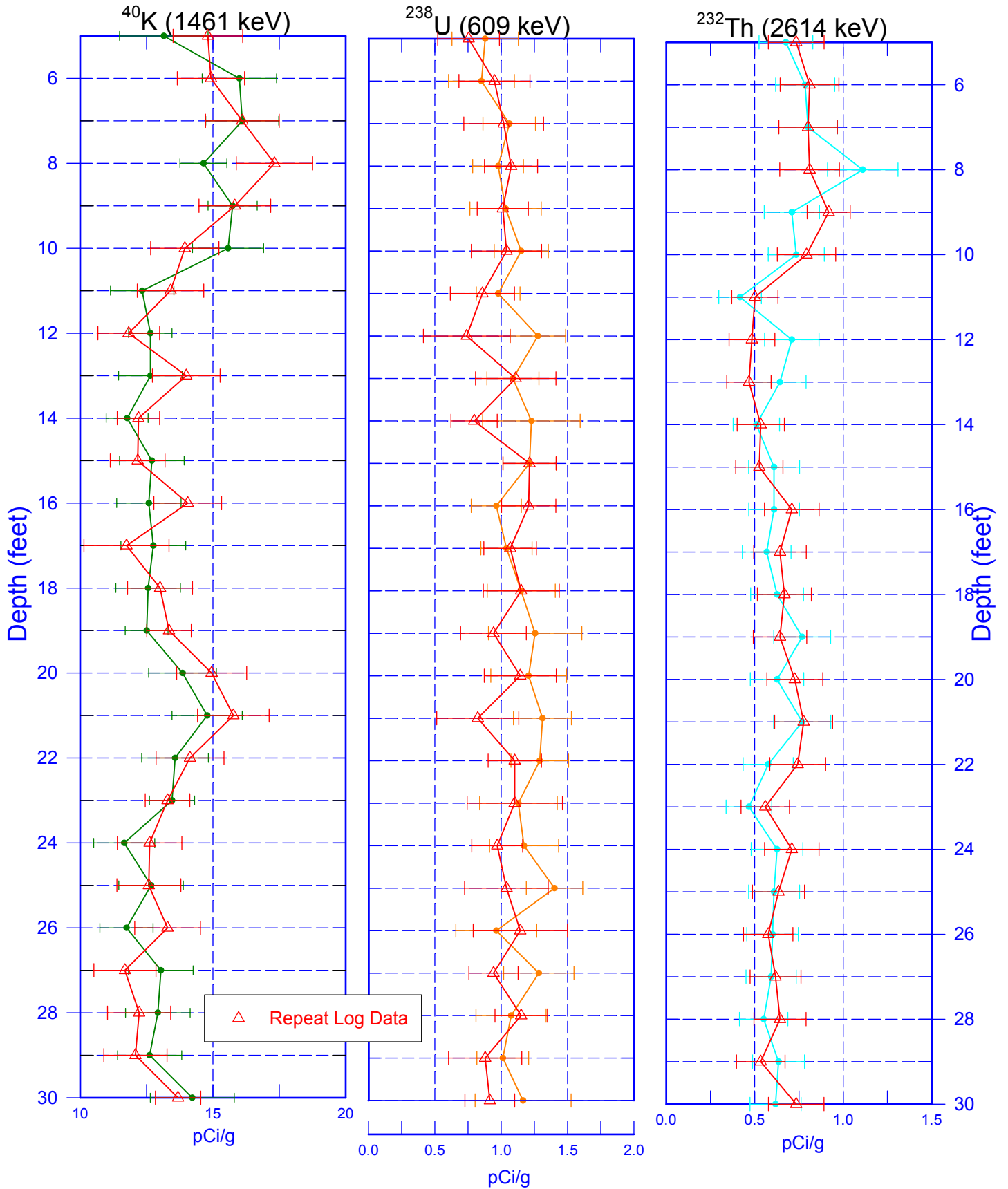


Reference - Top of Casing

Last Log Date - 06/30/03

299-W22-22 (A4967)

Repeat Section of Natural Gamma Logs



Zero Reference - Top of Casing

Last Log Date - 06/30/03